

SAMOPJ's Approach to Enterprise RSM GIS

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Mobile District

Mobile GIS in a Nutshell

- GIS In Mobile District
- eCoastal
- Infrastructure
 - SAMOPJ Team
 - System Design and Architecture
 - Where to start

GIS Implementation Goals

- To organize, develop and maintain various types of coastal data and resources into a comprehensive Geographic Information System (GIS).

What is eCoastal?

- Geodatabase structure that includes coastal related, SDS (Spatial Data Standard) compliant datasets
 - Bathymetric and condition surveys, dredging information, NOAA Charts, etc.
- Also includes a set of custom desktop (ArcGIS) and web (ArcIMS) applications designed for the coastal engineer

What is eCoastal? (cont.)

- eCoastal was derived from the development efforts of:
 - Regional Sediment Management (MDO)
 - DMSmart (CHL)
 - Silent Inspector (CHL)
- eCoastal acts as an enterprise solution for managing coastal specific datasets and associated applications

Why use a GIS?

- Develop a sediment budget for the region
- Facilitate the sharing of data
- Institutional knowledge



eCoastal: Regional Sediment Management GIS

Spatial Data

Data Management

- Geospatial
- Reports Management System
- Historic Information
- Model Results
- Time Series

Dredging Management

Sediment Budget Analysis

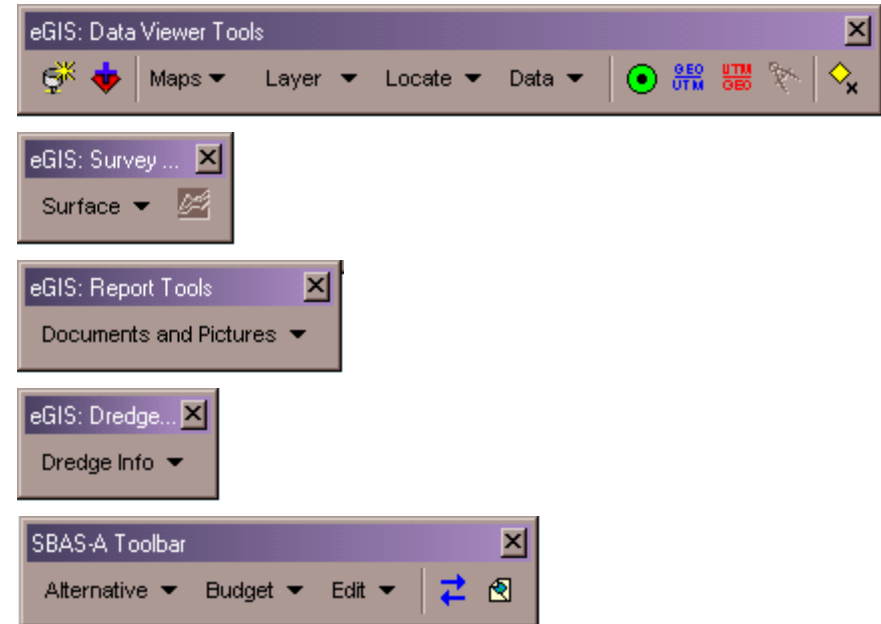
System

Analysis

eGIS Toolbox

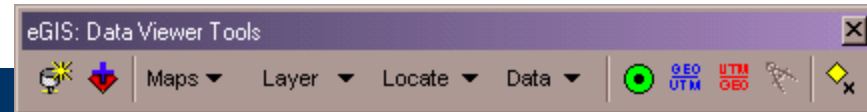
Spatial Data

- Data Viewer Tools
- Surface Tools*
- Report Tools
- Dredge Tools*
- SBAS-A Tools*



*Designed specifically for the eCoastal environment

Data Viewer



- **Add Data** from Database
- **Maps:** Create Quick Layout, Create Layout and Report
- **Layer:** Move Layers Up/Down, Sort Layers
- **Locate:** Find by XY, Find by Attribute
- **Data:** Add XY, Import Excel as Point, Bounding Polygon, Polygon Area
- **Tools:** Get Coordinate, Geo to UTM/UTM to Geo Coordinates, Draw Azimuth, Delete Graphics

Data Viewer - Data Retrieval

Spatial Data

Add Data

Select by Project Select by Category **Select by Keyword** Edit Layers

Enter Search Keyword:

mobile

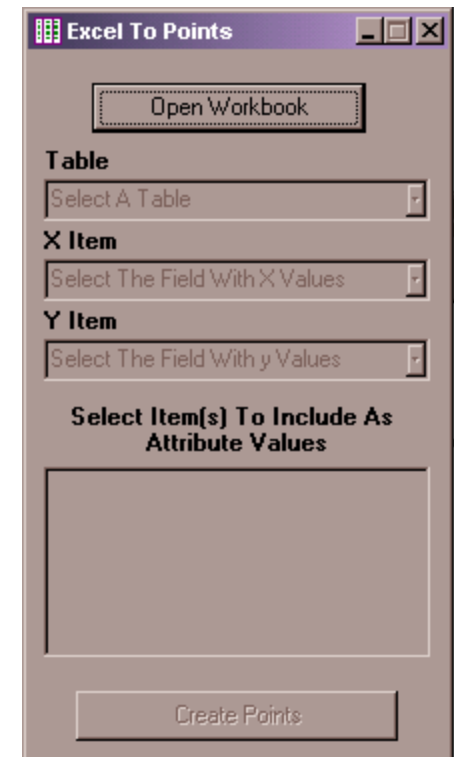
Search Results:

Project	Category	Layer	Description
Baseline 2002	Buildings	Baseline 2002 ...	Mobile and Baldwin Co...
Baseline 2002	Transportation Air	Baseline 2002 ...	Mobile & Baldwin Count...
Baseline 2002	Transportation ...	Baseline 2002 ...	Mobile & Baldwin Count...
Baseline 2002	Buildings	Baseline 2002 ...	Mobile & Baldwin Count...

Data Viewer: XY Data

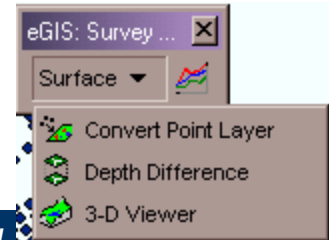
Spatial Data

- XY Points can be added to graphic locations
- XY Points stored in Excel Spreadsheets can be imported as Point Layers
- Users can calculate a bounding polygon
- Areas and perimeters of polygons can be calculated and attribute to the feature attributes.



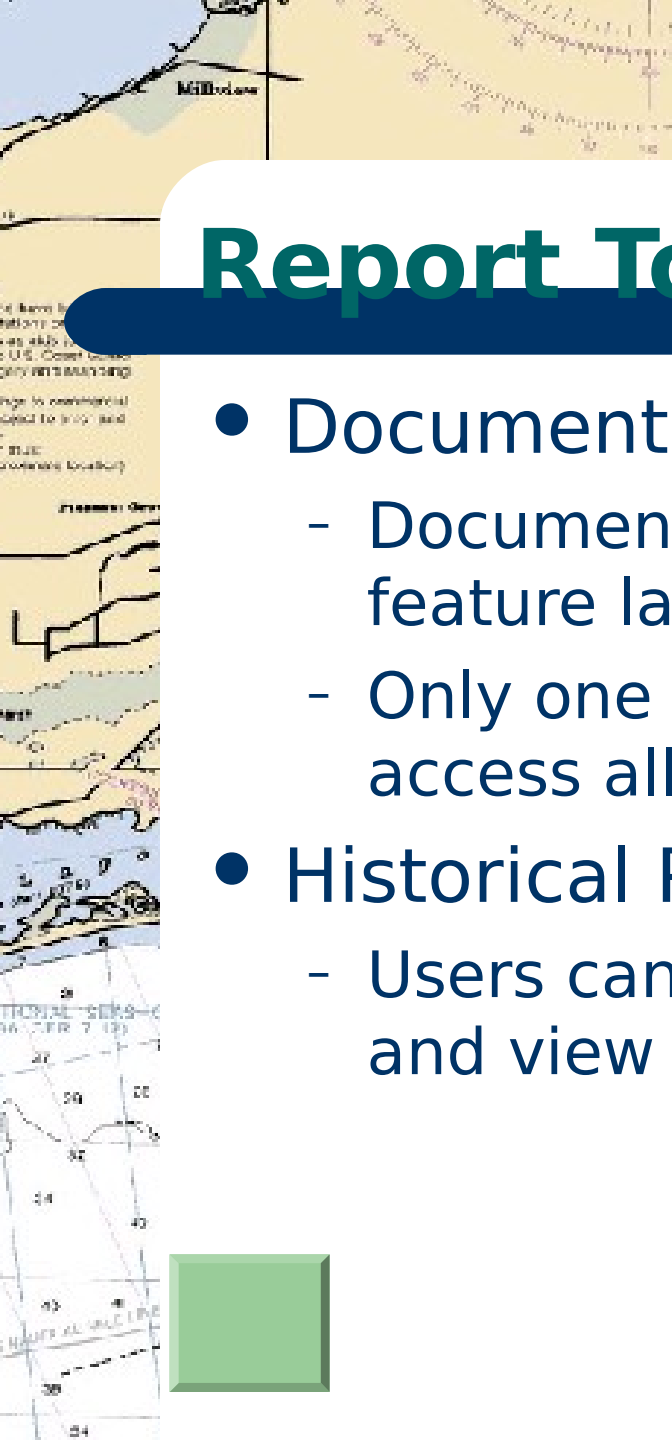
Survey Tools

Spatial Data



- Users have the ability to generate user-defined grid surfaces and TINs.
- View the data in 3D
- Cut Cross-Section Profiles through the data
- Calculate the Depth Differences



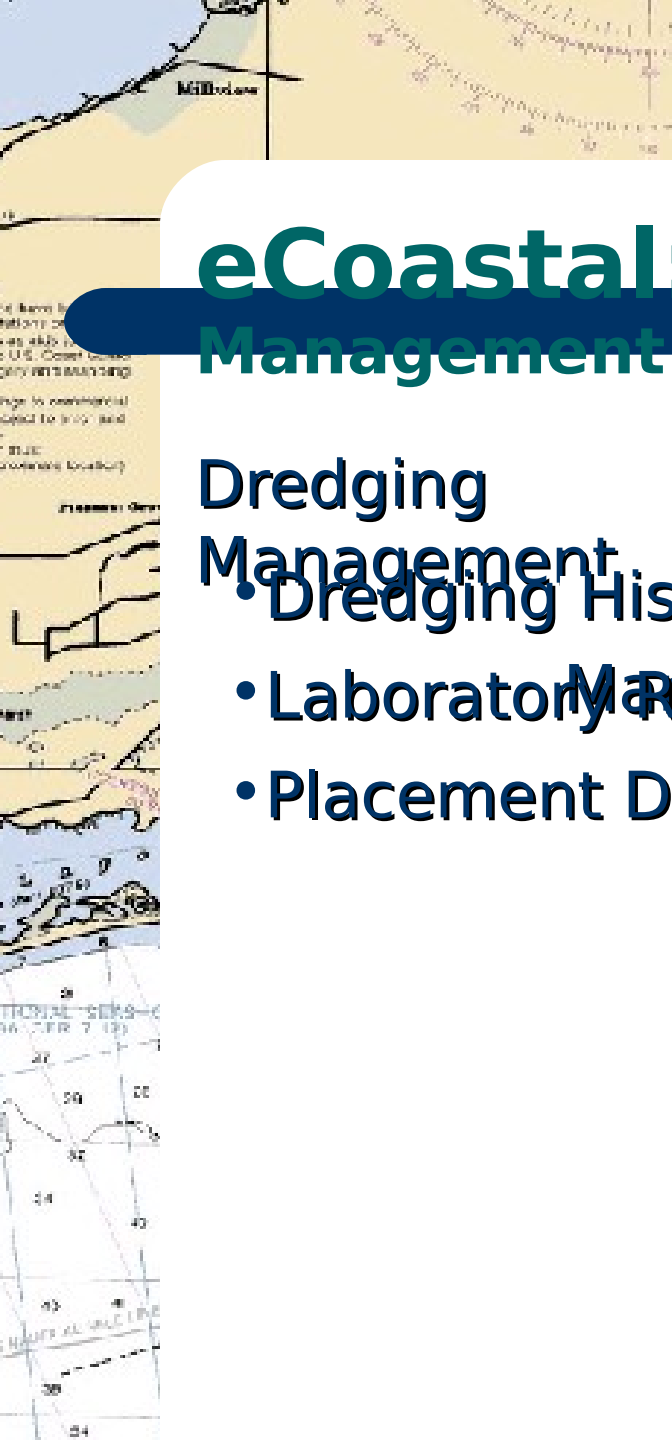


Report Tools

Spatial Data

- Document Manager
 - Documents can be referenced to various feature layers inside the GIS.
 - Only one application needs to be open, to access all related documents.
- Historical Photos
 - Users can use archived digital information and view information inside the GIS.





eCoastal: Regional Sediment Management GIS

Spatial Data

Dredging Management

- Dredging History
- Laboratory Management
- Placement Design

Data Management

Sediment Budget Analysis

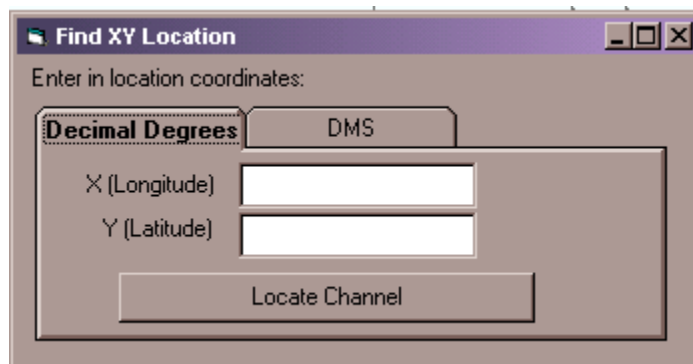
System

Analysis

Dredge Tools: Silent Inspector

Spatial Data

- Users can search the Silent Inspector Database, by location of channel, name of channel or keywords.
- Application queries the Silent Inspector Database and returns the results.



Find XY Location

Enter in location coordinates:

Decimal Degrees **DMS**

X (Longitude)

Y (Latitude)

Locate Channel



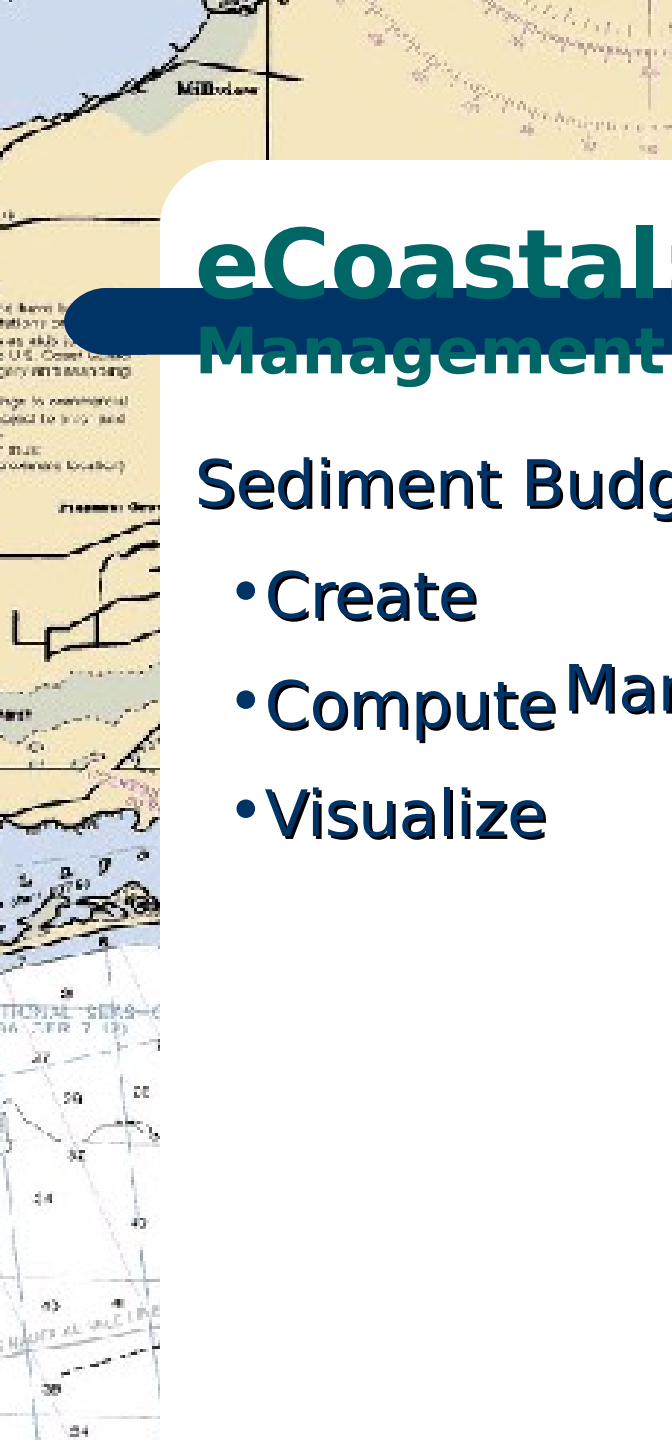
View Silent Inspector Data

Select Authorized Channel:

Select Project:

Item **Reach**

Zoom to Channel **Contract Info** **Dredge Info**



eCoastal: Regional Sediment Management GIS

Spatial Data

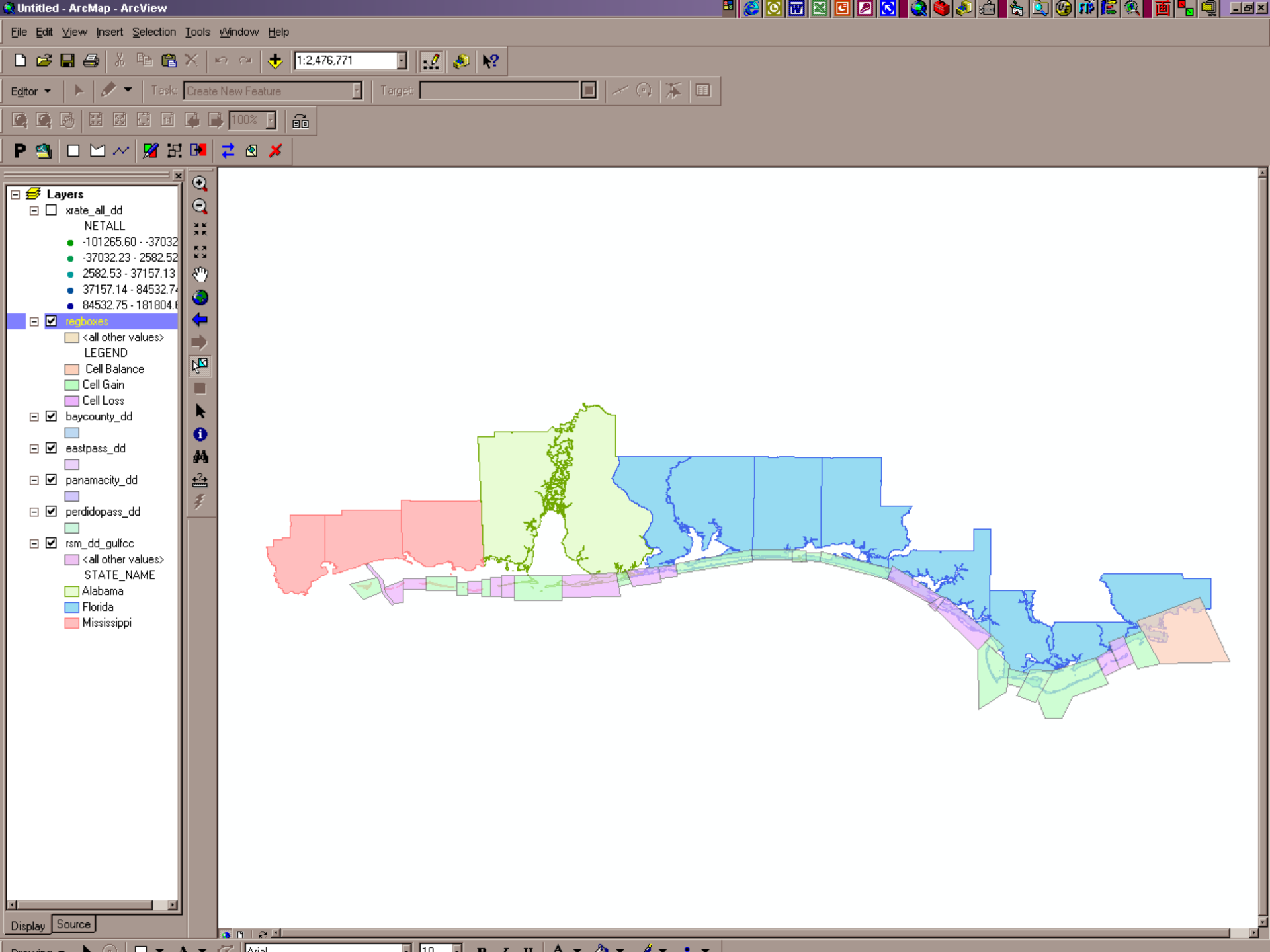
Sediment Budget

- Create
- Compute Management
- Visualize

Dredging Management

Data Management

Analysis



What is ArcIMS?

- IMS = Internet Map Server
- Internet solution for viewing geospatial data online.
- Simple browser interface, that users can access, display, and interact with data generated from GIS professionals.

Using IMS

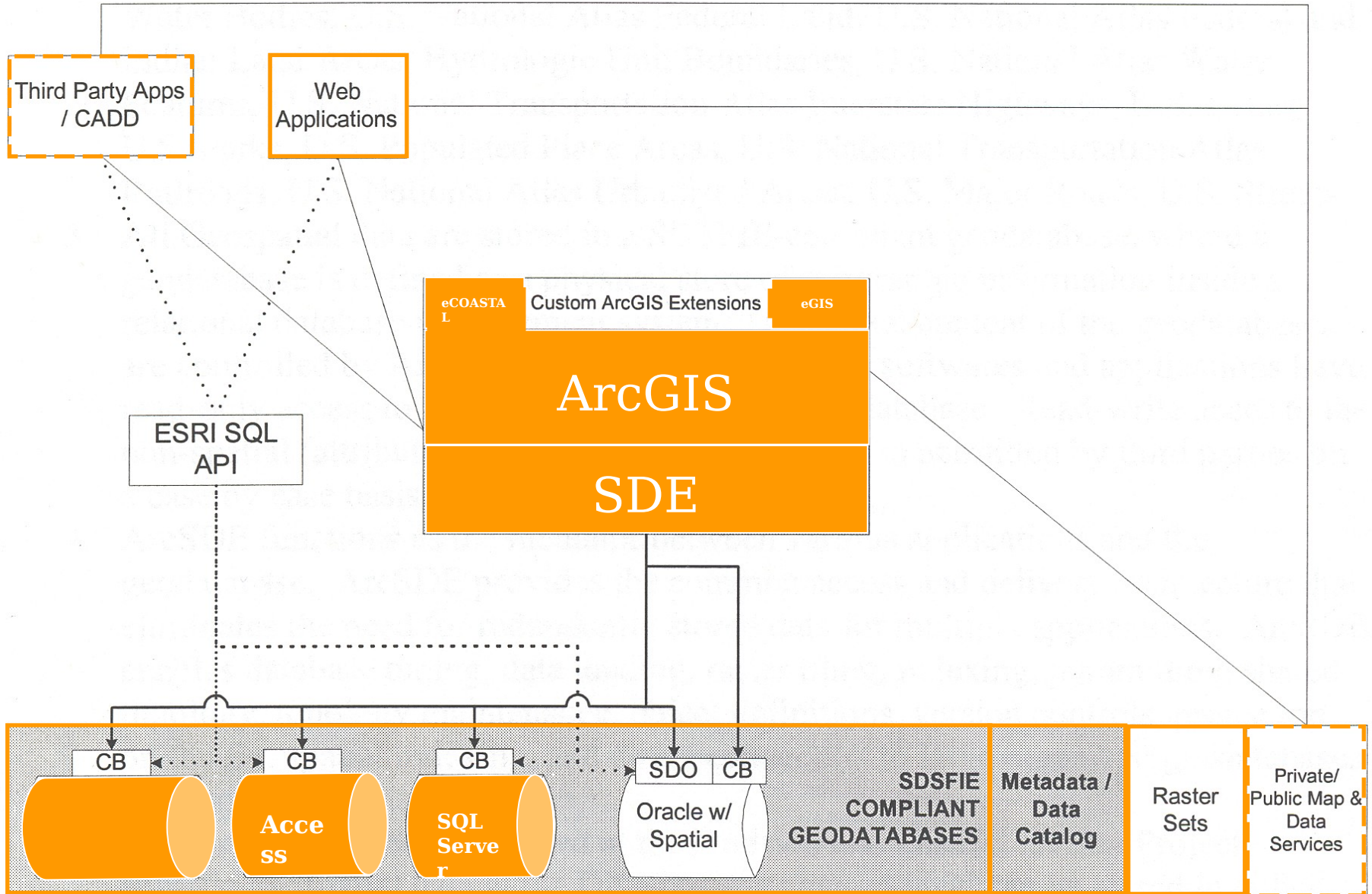
- Users have access to data 24/7
- Expensive software is ONLY needed for the developer. The average user only needs a web browser.
- The IMS can also be served as a Metadata Server.
 - Allows anyone to search on all available layers
 - Users can download data directly from the site for additional analysis.

USACE Enterprise GIS

**Integrated geospatial
technology *infrastructure*
delivering spatial information
products, services and
standard datasets to all
business elements and
processes of the organization**

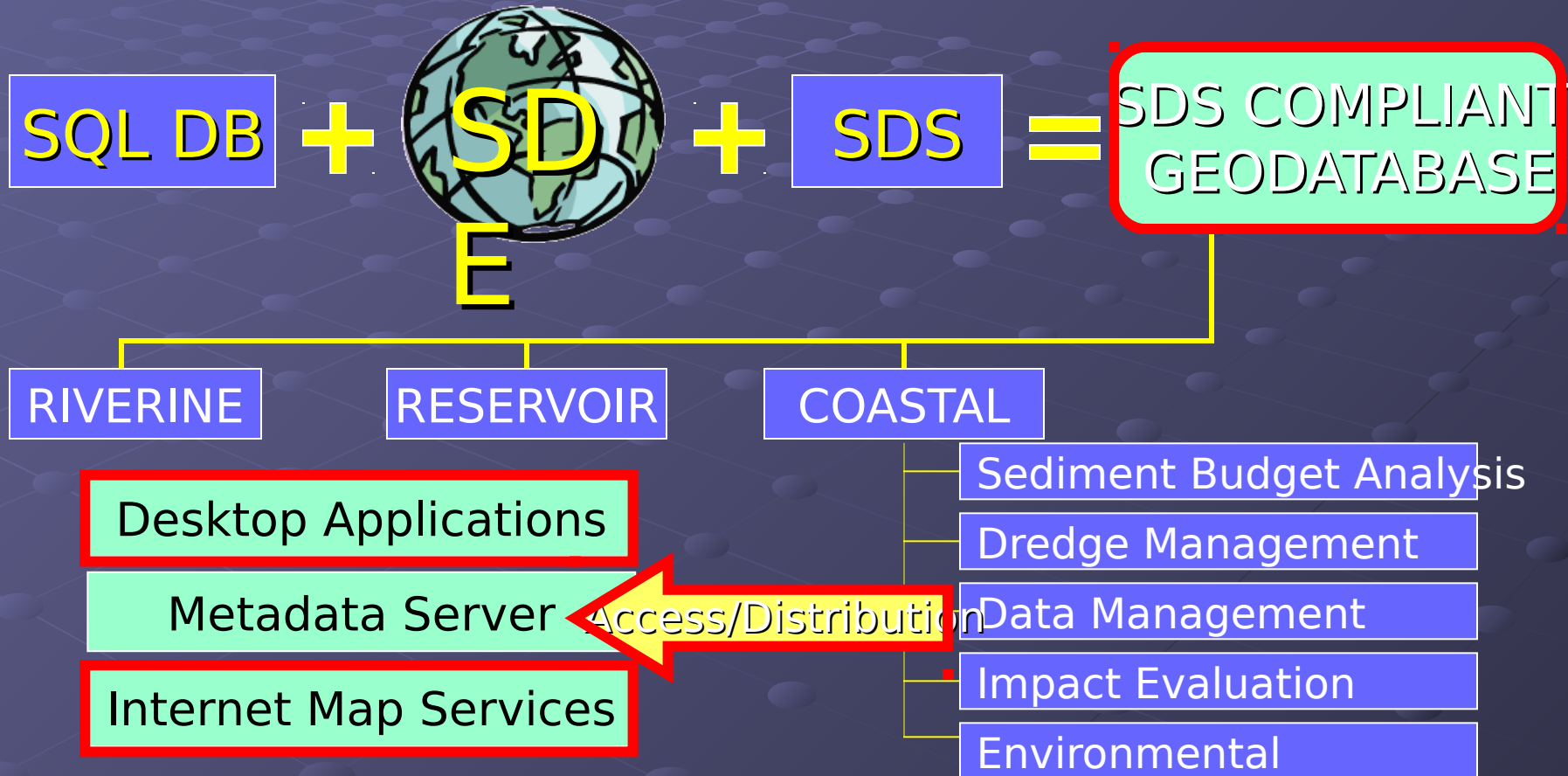


Official USACE Enterprise GIS Architecture



eCOASTAL is consistent with geospatial technology guidance from OMB and OSD

eGIS : Enterprise Solution & Decisions



eGIS Business Functions

- eCoastal: RSM, SBAS, Silent Inspector
- eReservoir: Shoreline Management, Sign Management
- eRiverine: BWT Bathymetry Update

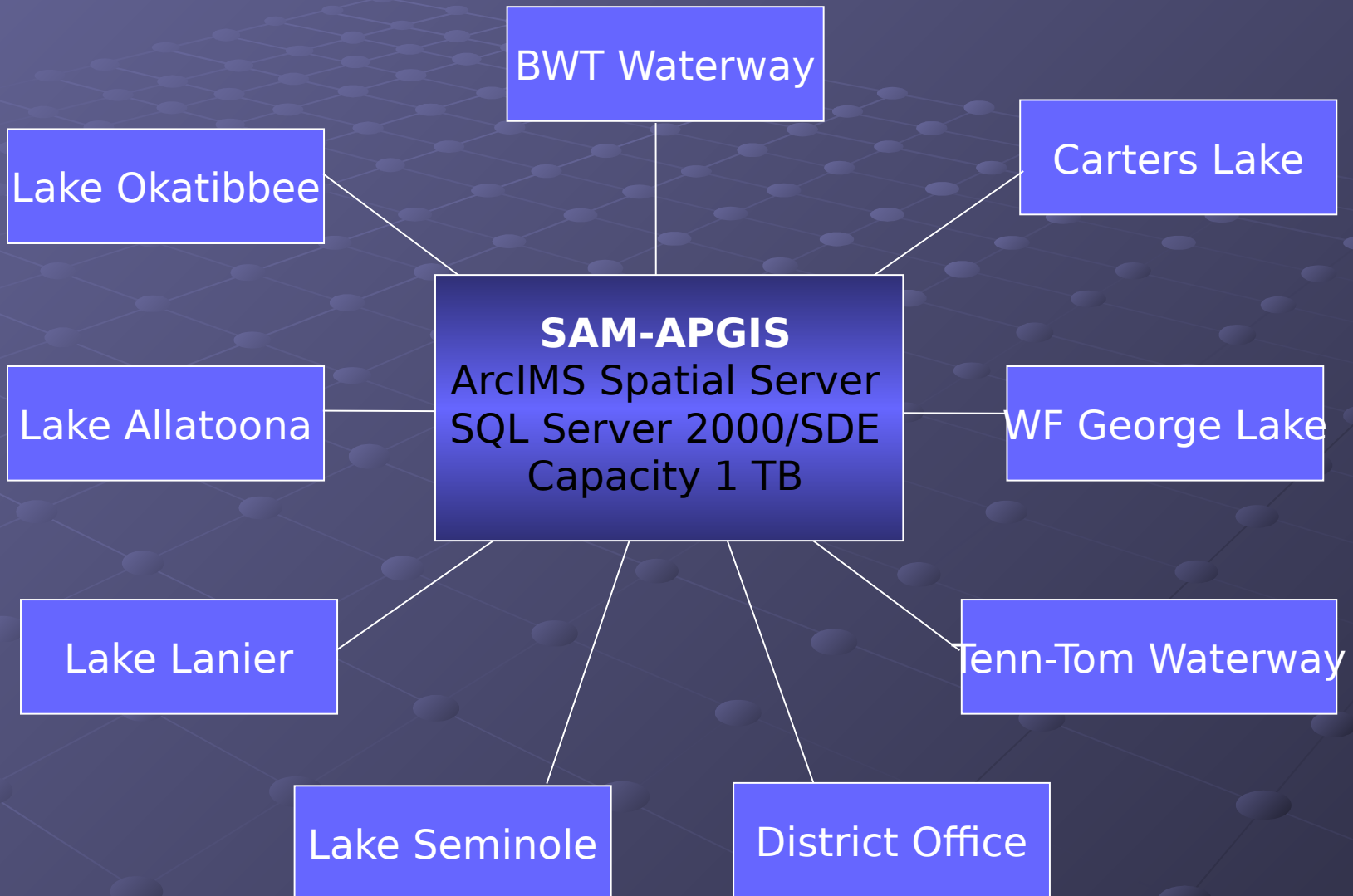


Each element fuels the
Enterprise GIS

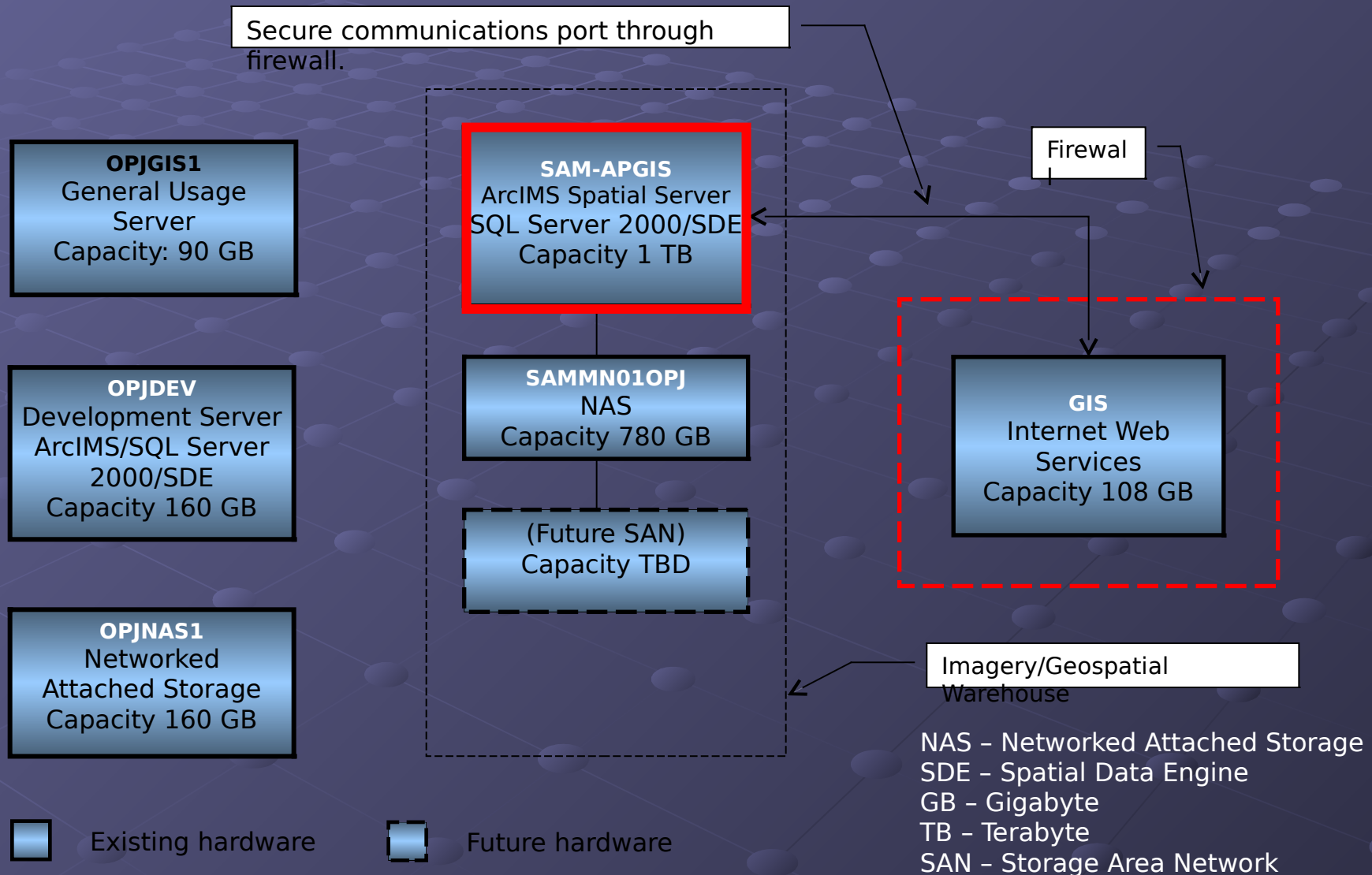
GIS in the Mobile District

- SAMOPJ serves as the primary POC for GIS development in the Mobile District
 - GIS Team: 4 Developers, 5 Analysts, 1 Project Manager
 - #1 job priority is to develop, populate or support GIS related databases and applications.
 - Each member has specialty (imagery, databases, vector editing, etc.)
 - SAMOPJ team members are delegated to various operations in the District
- District GIS User Groups help focus development of future applications

SAMOPJ-GIS Network



SAMOPJ-GIS Network



Geodatabase Population



- SDS Compliant Geodatabase
- Over 30 Feature Datasets
- Over 100 Feature Classes
- One geodatabase serves data, via map services, inside and outside the firewall.
- Approx 70 GB

Sample Feature Class

- Approx 50 million points (30 GB) in one feature class

GCWGS84_VECTOR.GCWGS84.channel_xsection_line
GCWGS84_VECTOR.GCWGS84.depth_contour_line
GCWGS84_VECTOR.GCWGS84.elevation_contour_line
GCWGS84_VECTOR.GCWGS84.elevation_profile_point
GCWGS84_VECTOR.GCWGS84.physiographic_area
GCWGS84_VECTOR.GCWGS84.sediment_modeling_point
GCWGS84_VECTOR.GCWGS84.sediment_sample_point
GCWGS84_VECTOR.GCWGS84.shoal_area
GCWGS84_VECTOR.GCWGS84.sounding_point
GCWGS84_VECTOR.GCWGS84.spot_elevation_point
GCWGS84_VECTOR.GCWGS84.survey_trackline



TOCOORD_Z	HYDSRV_ID*	QUASOU_D	PROJECT_ID*	ELEVATION
	0026	<Null>	C006	-11.9399995803833
	0026	<Null>	C006	-12.2399997711182
	0026	<Null>	C006	-11.5799999237061
	0026	<Null>	C006	-4.53000020980835
	0026	<Null>	C006	-11.0200004577637
	0026	<Null>	C006	-11.1499996185303

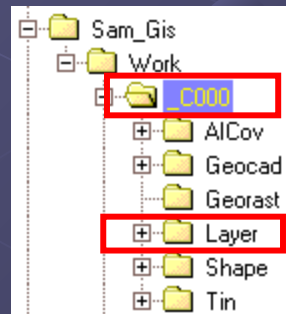
SDS Attributes include 2 ID fields that identify various surveys

System Architecture

Spatial Data Server

- Stores all vector and raster data in SQL Geodatabase
- Stores all layer files that reference the Geodatabase in the following directory structure:

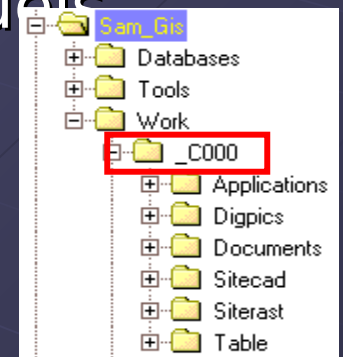
Project
Code



Non-Spatial Data Server

- Uses the following directory structure to store Documents, Digital Pictures, and the non-spatial database the fuels the custom application.

Project
Code



*directory structures are still in use to support those users who still maintain shapefiles.

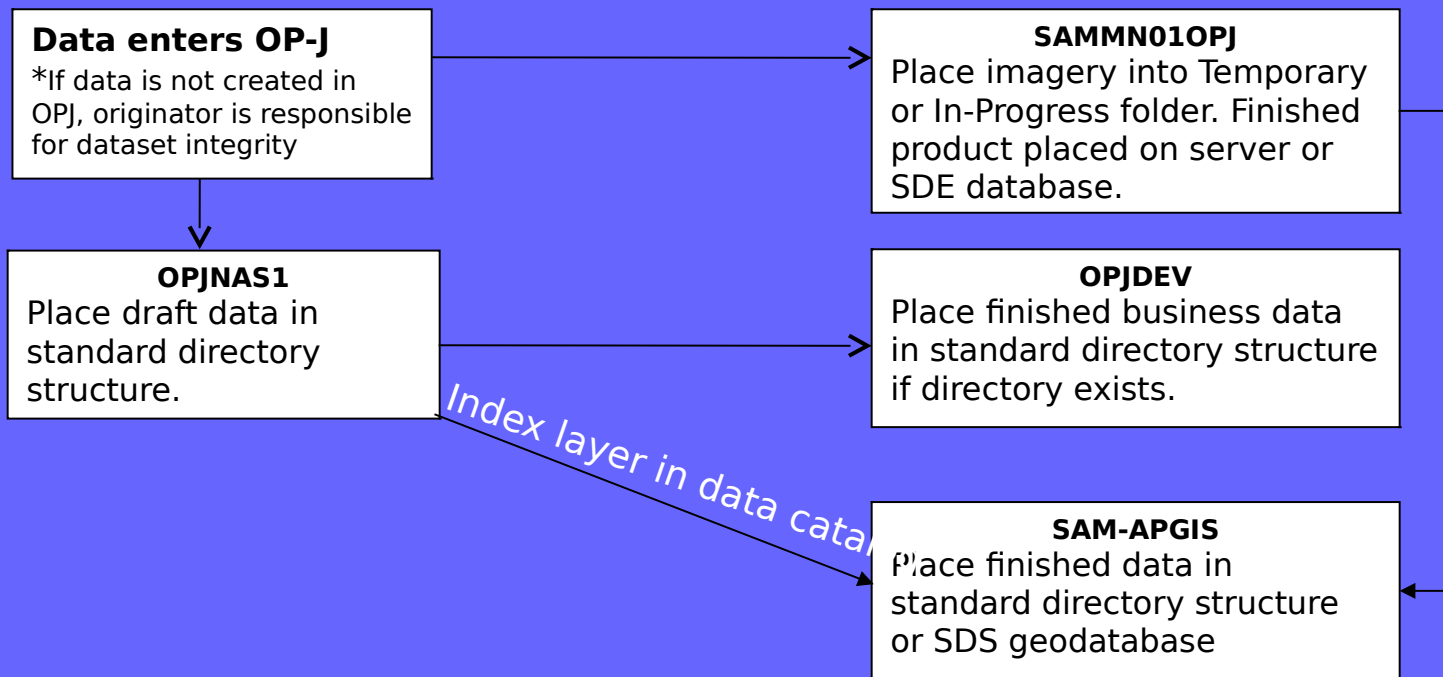
Supplemental Database

- GIS Management Database has been created to handle supplemental data
 - Simple MS Access database
 - .NET Web Application
- Non-spatial data indexing
 - Layer File Index
 - Project Code Index
 - Document Manager Index

Why Layer Files?

- Layer File = *.lyr
- Layer files retain layer symbology, database connection strings, and definition queries
- Compatible with feature classes and shapefiles
 - Can be leveraged to various types of project infrastructure – directory structure vs geodatabase

Business Flow



Data Access

- Users can access data via an ArcGIS desktop interface with custom data retrieval applications.
- ArcIMS services have been established to view, analyze and download datasets.

eGIS Support

- User guides, video demonstrations and hands-on set-up are provided to set a firm foundation for the system
- Support message board on SAMOPJ website
- GIS POC designated to each office installation

Phase I =

Steps to Create a Comprehensive eGIS

● Acquire data

- Provide detailed scope of work to ensure data is delivered in GIS-ready format
- Develop Standard Operating Procedures to assist in data management

● Pre-process data

- Set projections, SDS compliancy, clean topology, etc.

Data Acquisition (cont.)

- Scope of Work

- Web Tutorial

- Sample Datasets:

- Sample coastal datasets are available through the Spatial Data Branch Website

- Lidar Data: points, TINs, Grids

- Basemap Data: roads, counties, points of interest, cities, etc.

- Raster Data: timeline of Imagery, NOAA Charts, Quad Sheets

Data Acquisition (cont.)

- Collecting tabular information in a relational database format:
 - Boring log filenames and ID
 - Tracking associated documents by layer name
 - Wave gage data

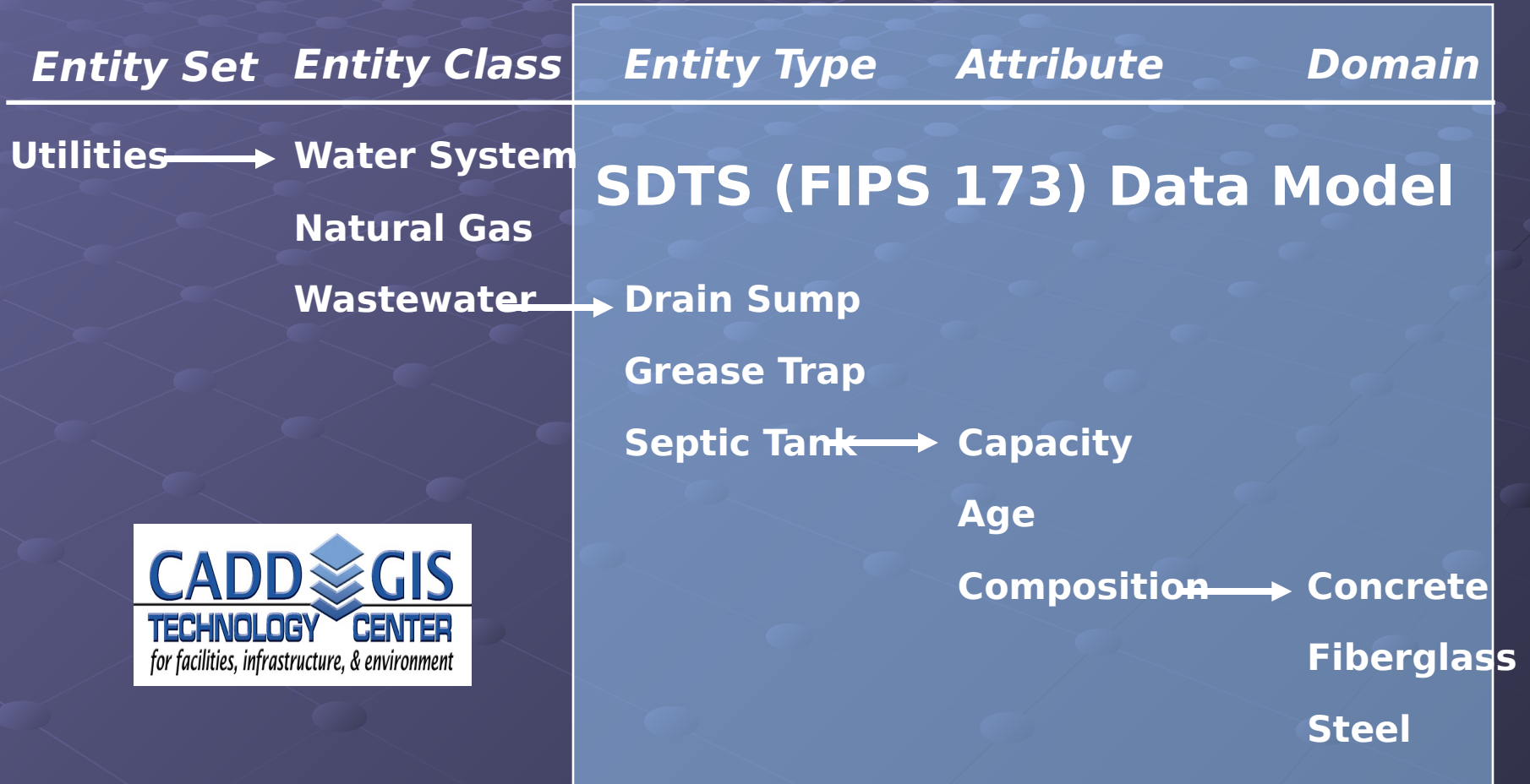
Phase II: Data Formatting

- Detailed instructions for formatting coastal related datasets are available online
- Quality control all datasets
 - Check scale, accuracy and validity of sources
- Create detailed metadata
 - To be distributed across the eGIS, all datasets must have an associated FGDC compliant metadata file
 - Analyze metadata to ensure datasets are up to project standards

Formatting Data (cont)

- Formatting CAD Navigation Channels
- Formatting Paper Maps to Georeferenced Raster Images (with Coordinates)
- Working with Vector Data
 - Importing Excel Points
 - Creating Event theme
 - Creating a Grid theme
 - Creating a TIN
- Create Layer Files

SDSFIE Relational Data Model



eGIS Implementations

- ArcGIS Desktop Demonstration of populated database and applications
 - SAD – *Jacksonville, Charleston, MDO Resource Offices*
 - NAD – *Philadelphia*, Wilmington
 - SWD – Fort Worth, Galveston
 - LRD – Detroit